

SELF-LOCKING ROLL-OVER FLAP WITH HOOK LOCK**Related Applications**

This application claims priority of Provisional Application 60/425619 filed 11/12/02.

Technical Field:

This invention relates to packaging. More specifically, the invention relates to a multi-sided container or box made of corrugated paperboard. In particular, the invention relates to a corrugated paperboard tray for containing poultry products, wherein the tray is configured for manual set up
5 and has an improved self-locking feature for retaining the walls of the tray in erected position.

Background Art:

Various styles of containers, including paperboard boxes, are known in the prior art for containing a variety of products. Cut poultry pieces, for example, are frequently packed in a
10 paperboard container, and sometimes the poultry pieces are packed with ice. These containers are generally referred to as poultry trays, and are usually made from a unitary blank of corrugated paperboard, which may be treated on one or both sides with wax or other material to impart rigidity and resistance to water degradation.

Conventional paperboard containers are configured for either machine set up or manual set
15 up, and generally are either rectangular or octagonal in plan view, with four sides or eight sides, respectively. An example of a prior art eight-sided container is disclosed in applicant's prior patent 5,752,648. The embodiment shown in figures 1 and 3 of that patent is configured for manual set up, and has three overlapping end panels 18, 24 and 24, with notches 30 formed in the top edges of the two end panels 24, and a roll-over flap 34 foldably joined to the top edge of end panel 18 by short
20 narrow webs formed between transverse cuts or relief slits 37 extending in spaced relationship transversely across cut lines 36 and 38, and interrupting the cut lines. Pairs of short cuts or slits 39 are formed in the webs parallel to the cut lines 36 and 38, but spaced from one another on opposite sides of the cut lines a distance approximately equal to the combined thickness of the three overlapped end panels. The slits 39 promote bending or folding of the webs along fold lines
25 extending through the slits.

To erect the container, the two end panels 24 are folded inwardly into overlapping registry with one another, and the end panel 18 is then folded into overlapping relationship with panels 24. The roll-over flap 34 is then folded inwardly and downwardly over the upper edges of the panels 24,

causing the webs to drop into notches 30, and the upwardly extending portions of panels 24 on opposite sides of the notches to project upwardly through the cuts formed by the cut lines 36 and 38. The relationship of the relief slits 37 and cut lines 36 and 38 causes a "heel" to be formed on the edge of the roll-over flap, and this heel produces an over-center effect when the roll-over flap is folded over the panels 24. The heel engages against the inner surface of the innermost end panel 24 to keep the roll-over flap in its folded position, and thereby maintains the container in erected condition.

While the arrangement disclosed in 5,752,648 provides a simple and effective self- locking system for holding the container in its erected condition, the thickness of the material of the webs causes them to take a slightly "rounded over" shape as they are pulled down into the notches 30, and they tend to exert a pull on the roll-over flap in a direction to disengage it. Additionally, in order to insure that the webs and related components can be operatively engaged with one another, specific dimensional relationships are maintained between the distance from the bottoms of the notches to the bottom of their associated panels 24, and the distance which the relief slits 37 extend above the cut lines 36 and 38, i.e., the length of the relief slits is slightly exaggerated, contributing to a "loose" fit between the components of the self-locking arrangement.

A solution to this was offered in applicant's co-pending patent application, published March 13, 2003, under publication number US-2003-0047592-A1. The container disclosed in this application is similar to that used in 5,752,648, but is modified to achieve a tighter fit between components of the self-locking arrangement and provide a more reliable interlocking of the components. More specifically, the container disclosed in US-2003-0047592-A1 has a bottom wall, opposite side walls, and opposite end walls, with means on the end walls that interlock to hold the container in its erected condition. The container is made from a unitary corrugated paperboard blank having a bottom panel that forms the bottom wall, opposite side wall panels foldably joined to opposite sides of the bottom panel and that form the side walls, and end panels extending from opposite ends of the bottom panel and side wall panels, respectively, at least some of the end panels overlapping to form the end walls. At least one notch is formed on an upper edge of at least one of the end panels, and a roll-over flap is formed on an upper edge of another end panel, in positions to interlock with one another when the end panels are folded into operative relationship with one another to form an erected container.

In particular, the self-locking structure in US-2003-0047592-A1 has a plurality of notches formed in the edge of at least one end panel, defining at least one tab projecting upwardly from the edge of the panel, and the roll-over flap is foldably joined to its associated end panel by webs formed between a cut line that lies parallel to the fold for the roll-over flap, and relief slits that extend transversely across the cut line. The webs are adapted to lie in the notches, with said at least one tab projecting into a slot formed by the cut line when the roll-over flap is folded inwardly and downwardly over the end panels. The webs are at least partially crushed on the side thereof that faces downwardly in the notches so that they lie substantially flat in the notches. In addition, the dimensional relationships of the self-locking arrangement are made tighter to affect a tighter fit between components, producing a more reliable interlock. Specifically, the distance from the bottom of the notches to the bottom of their associated panels is made smaller than in a tray having a conventional self-locking arrangement, and the length of the relief slits is also made smaller.

However, the prior self-locking roll-over flap as disclosed in the co-pending patent application identified above, and as illustrated in figures 1 and 2 attached hereto, may come unlocked under stress, e.g., when force is exerted against the side walls by product in the container, causing the package to partially disassemble.

Accordingly, there is need for a self-locking arrangement that provides a tight, secure fit between components, and that does not come unlocked under stress, insuring that a container incorporating the arrangement reliably remains in its erected condition.

Summary of the Invention:

The invention is a paperboard container of the type having a self-locking roll-over flap on at least one wall, wherein the roll-over flap is foldably joined to an outer wall panel by a roll-over panel. The top edge of the roll-over panel has an extended heel portion that abuts against an adjacent end panel top edge to hold the roll-over panel in position. In particular, according to the present invention, a "hook" or shaped recess is formed in the edge of one or more of the tabs formed on the end panel top edges to engage an edge of the roll-over panel and act as a positive detent against the edge of the roll-over panel and prevent it from opening.

More specifically, the container of the invention has a bottom wall, opposite side walls, and opposite end walls, with means on the end walls that interlock to hold the container in its erected condition. The container is made from a unitary corrugated paperboard blank having a bottom

panel that forms the bottom wall, opposite side wall panels foldably joined to opposite sides of the bottom panel and that form the side walls, end flap panels extending from opposite ends of the side wall panels, and end wall panels extending from opposite ends of the bottom panel, at least some of the end panels overlapping to form the end walls in accordance with the invention. At least one notch is formed on an upper edge of at least one of the end flap panels, and a roll-over flap is formed on an upper edge of the end wall panel, in positions to interlock with one another when the end panels are folded into operative relationship with one another to form an erected container.

In particular, a plurality of notches are formed in the edge of at least one end flap panel, defining at least one tab projecting upwardly from the edge of the panel, and the roll-over flap is foldably joined to its associated end wall panel by webs formed between a cut line that lies parallel to the fold for the roll-over flap, and relief slits that extend transversely across the cut line. The webs are adapted to lie in the notches, with said at least one tab projecting into a slot formed by the cut line when the roll-over flap is folded inwardly and downwardly over the end panels.

The webs may be crushed on the side thereof that faces downwardly in the notches so that they lie substantially flat in the notches. In addition, the dimensional relationships of the self-locking arrangement are made tighter to affect a tighter fit between components, producing a more reliable interlock. Specifically, the distance from the bottom of the notches to the bottom of their associated panels is made smaller than in a tray having a conventional self-locking arrangement, and the length of the relief slits is also made smaller.

The "hook" or shaped recess noted above, and which represents an improvement over the invention disclosed in co-pending published application US-2003-0047592-A1, is formed in the edge of one or more of the tabs formed on the end flap panel top edges to act as a positive detent against the edge of the roll-over panel and prevent it from opening under stress.

A further aspect of the container disclosed and claimed herein is a crushed area formed in the top panel of the container cover adjacent the fold joining the end panel of the cover to the top panel. This crushed area provides a relief space for the inwardly folded end flaps that are connected to the side panels of the cover, and captured by the roll-over flap or panel in an erected cover, enabling a more accurate fit of the cover and avoiding bowing of the sides when the cover is folded into erected condition. This feature is particularly useful when the slit in the cover blank that separates the end flaps from the end panel is made in axial alignment with the score line that joins the side panel to the top panel, since in this configuration there is a very tight fit between the panels

when folded. Additionally, the material along each side of the slit is crushed to provide adequate space to enable the panels to be folded together.

A still further aspect of the container disclosed and claimed herein resides in the locking tab that projects downwardly from the end walls of the cover and which engage in the handholds in the ends of the box when the cover is in place to help retain the cover on the box. In the present invention the locking tab has a lower free end with a downwardly and outwardly directed rounded wing on each of the opposite sides of the free end. The end of the tab between the wings has an arcuate, concave shape. In use, the wings and arcuate end on the tab facilitate flexing of the end of the tab through the handholds, and the concave arcuate shape facilitates insertion of a finger or fingers behind the end of the tab to retract the tab from the handhold.

The invention is a simple, economical and effective way to reliably interlock components of a self-locking arrangement in a container constructed for manual set up. It adds no cost to the container.

Brief Description of the Drawings:

The invention is described in greater detail hereinafter with reference to the drawings, wherein like reference characters designate like parts throughout the several views, and wherein:

Figure 1 is a top perspective view of a four-sided rectangular container as disclosed and claimed in applicant's co-pending published application, number US-2003-0047592-A1, and is of the type in which the present invention can be employed.

Figure 2 is an enlarged plan view of one end of the blank for forming the container of figure 1.

Figure 3 is a further enlarged fragmentary plan view showing further details of one corner of a container incorporating the invention, and differing from the arrangement shown in figure 2 in that the roll-over flaps do not extend all the way across the width of the end wall, the corners of the end flaps are angled, cut-outs are made in the slit separating the end flaps from the end panels, and diagonal corner panels are provided.

Figure 4 is an enlarged fragmentary inside end view of the container of figure 1, showing in greater detail the locking features of the self-locking roll-over flap.

Figure 5 is a fragmentary top perspective view of one end of a four-sided container incorporating the improvements of the present invention.

Figure 6 is an enlarged fragmentary inside end view of the container of figure 5, showing in greater detail the improved locking features of the self-locking roll-over flap.

Figure 7 is a top plan view of a blank for making a first embodiment of the container of the invention, wherein the container has eight sides and incorporates a double hook arrangement for engaging the edges of the roll-over panels to retain them in position, and wherein the hooks in each pair of hooks point toward one another.

Figure 8 is an enlarged fragmentary top plan view of one corner of a blank incorporating the improved locking feature depicted in figure 7, and showing a slightly modified bag cuff grab means.

Figure 9 is a further enlarged, fragmentary plan view of the hook embodying the improved locking feature of the present invention.

Figure 10 is an enlarged fragmentary top plan view similar to figure 8, showing a second embodiment of the improved locking feature, wherein only a single hook is employed in each end flap, the hook being located adjacent the end of the flap connected to the associated side wall panel of the container.

Figure 11 is a view similar to figure 10 of a third embodiment, wherein the hook is located adjacent the end of the end flap that is remote from the associated sidewall panel of the container.

Figure 12 is a view similar to figure 10 of a fourth embodiment, wherein two hooks are employed, but both hooks are oriented to point in the same direction, i.e., away from the associated side wall.

Figure 13 is a top plan view of a blank for making a first embodiment of a cover incorporating the improved locking feature of the present invention, and also incorporating crushed areas to make space for accommodating the end flaps when they are folded inwardly and captured by the roll-over flap in an erected cover.

Figure 14 is a view similar to figure 13, showing a cover that incorporates the locking feature of the invention, but does not have the crushed areas.

Figure 15 is a top perspective view of an eight-sided container having a cover and bag cuff grab means.

Figure 16 is a top perspective view of the container of figure 15, with the cover removed and showing a bag in place.

Detailed Description of the Preferred Embodiments:

A rectangular or four-sided container incorporating the self-locking means disclosed in co-pending published application number US-2003-0047592-A1 is depicted at **10** in figure1. The structure of this container is the same as the structure incorporating the present improvement, and
5 except for the hook feature to be described hereinafter, the following description applies equally as well to the container incorporating the present improvement.

The container **10** comprises a bottom wall **11**, opposite parallel side walls **12** and **13**, and opposite parallel end walls **14** and **15**. Each end wall comprises two end panel flaps **16** and **17** foldably joined to opposite ends of respective side walls, and an end wall panel **18** foldably joined
10 to the end of the bottom wall. In this regard, it should be understood that the end flaps each can extend the full width of the end wall, or only partially. Figures 4 and 5, for instance, depict an arrangement wherein the end flaps each extend only approximately two-thirds the width of the end all. Cuts **19** are made in the end flap panels **16** and **17** and in the end wall panels **18** to define handholds when the container is erected.

15 A plurality of notches **20** are formed in each end flap panel **16** and **17** along an outer edge, which becomes the upper edge when the container is set up, forming a pair of upwardly projecting tabs **21** and **22**.

A roll over flap **23** is joined to the outer, or upper, edge of end wall panel **18** by a plurality of webs **24** defined by cuts or relief slits **25** and **26** made transversely across a cut line **27**, and
20 interrupting the cut line, which extends completely across the width of panel **18** except at the webs **24**. Short fold promoting slits **28a** and **28b** are made parallel to the cut line **27** on opposite sides thereof in locations to define the length of the webs when the roll-over flap is folded into its operative, locked position. In other words, the slits **28a** and **28b** initiate folding at opposite ends of the web along fold lines extending through the slits. The length of the webs, as defined by the
25 spacing between the slits, and thus between the fold lines extending through them, is substantially the same as the combined thickness of the total number of overlapping end panels.

As indicated by the shading in figures 2 and 3, the web **24** is crushed in the area between the cuts **25**, **26** and fold promoting slits **28**. The crush is made on the side of the web that faces inwardly of the container when the container is set up. Crushing of the web enables the web to extend more
30 deeply into the notches, and provides a sharper fold along the fold lines promoted by the slits **28a** and **28b**. It also enables other dimensions of the container to be tightened up, as described more

fully below, developing a tighter and more reliable self-locking arrangement. It should be noted that while figure 3 is used to show the details of construction of the self-locking arrangement, and reference characters applicable to figures 1 and 2 are used, figure 3 actually portrays a portion of a blank designed for making the eight-sided container of figure 15.

5 To erect the container, the side walls 12 and 13 are folded upwardly, and the end flap panels 16 and 17 then folded inwardly into overlapping relationship with one another. As seen in the drawings, panel 17 is folded inwardly first, although the sequence of folding the two end flap panels is not essential. As folded, the notches 20 and tabs 21 and 22 on the two end flap panels are in registry with one another. The end wall panel 18 is then folded upwardly over the panels 16 and 17,
10 and roll over flap 23 is folded inwardly and downwardly over the upper edge of the end flap panels and end wall panels, causing the webs 24 to drop into the notches and the tabs 21 and 22 to project upwardly through the gap formed by the cut line 27. Because of the spacing of the cuts 25, 26, 27 and 28a and 28b, a "heel" 30 is formed on the roll-over panel in the areas on opposite sides of the webs, and this heel engages against the inner surface of end flap panel 17, holding the roll-over flap
15 in its downwardly folded and locked position inside the panel 17.

 The dimensional relationships of the self-locking structure can best be seen with particular reference to figures 1, 2 and 3. The spacing "A" between the bottom of the notches 20 and the bottom edge of the associated end flap panel 16 or 17 is increased slightly over the spacing in the prior self-locking arrangement shown in patent 5,752,648, and the spacing "B" between the bottom
20 edge of end wall panel 18 and the closest slit 28b is reduced slightly from the spacing in the prior self-locking arrangement. The spacing between the slits 28a and 28b, as noted previously, is selected to be substantially the same as the combined width of the total number of overlapping end panels. It will be noted that the slits 25 and 26 extend slightly beyond slit 28a a distance "C", defining relief slits for the folded roll over flap. Slit 28a is spaced from cut line 27 a distance "D"
25 approximately equal to a thickness of one of the end panels, and slit 28b is spaced on the opposite side a distance "E" approximately equal to the combined thickness of the total number of overlapping end panels, minus the thickness of one panel.

 When the roll-over flap 23 is folded downwardly alongside panel 17, the heels 30 extend upwardly and above the fold line that extends through slits 28b, preventing the flap from
30 disengaging from its locked position. To function properly, the upper edge of the heel, when the

roll over flap is in its operative folded position, is spaced below the upper edge of the tabs a distance "F" equal to at least the combined thickness of two panels.

The improvement of the present invention is incorporated in the foregoing structure, as depicted in figures 5-12, 15 and 16. With particular reference to figure 9, the improvement comprises a shaped cut **40** in one side edge of at least one of the tabs **21** and **22** on at least one of the end flaps **16** and **17**, forming an undercut nose or hook **41** at one side of the notch **20**. It will be noted that the cut **40** also extends into the bottom of the notch **20**. The hooks **41** on each end flap are pointed toward the side wall connected with that end flap. Thus, when the roll-over flap **23** is folded inwardly and downwardly over the in-turned end flaps **16** and **17** and the associated end panel **18**, and the roll-over panels or webs **24** (shown in broken lines in figure 9) are pulled down into the notches **20**, one edge **24a** of at least one of the roll-over panels is engaged beneath the hook **41**. Since the hook points toward the side wall to which the associated end flap is joined, any outwardly directed force on the side wall will tend to pull the associated end flap and hook toward the roll-over panel or web **24**, tightening the engagement of the edge of the web beneath the hook, and securing the web against displacement from the notch, thereby preventing release of the roll-over flap **23**. It will be noted that the hook **41** is rounded, having a tapered lead-in **42** that facilitates movement of the edge of the web past the hook.

In the embodiment depicted in figures 5 and 6, the end flaps **16'** and **17'** do not extend all the way across the width of the end wall **15**, and each flap has a hook **41** formed on the tabs **22a** and **22b**, respectively, adjacent the associated side wall, with the hooks oriented or pointing toward the associated side wall to which the respective end flaps are joined. Figure 11, for example, shows an arrangement in which only one hook **41** is formed on an end flap, with the hook being formed on the tab **21** at the outer end of the flap. Although only one flap is shown in this figure, it should be understood that an identical structure is duplicated on the flaps at the other side and ends of the container. The other notch **20**, at the end of the flap adjacent the associated side wall, is unmodified from that shown in co-pending published application US-2003-0047592-A1.

The difference between the present improvement and the invention disclosed in US-2003-0047592-A1 can clearly be seen by comparing figures 4 and 6.

Figures 7 and 8 show a blank and a portion of a blank, respectively, for making one embodiment of a container according to the invention, wherein a pair of oppositely oriented hooks **41a** and **41b** are formed at the edges of the notches **20** in the end flaps **16** and **17**. With this

arrangement, a tighter relationship is achieved between the components of the container as they are being moved into set-up position, but after set-up, only that hook **41a** pointing toward the side wall to which that end flap is attached will have any appreciable effect in engaging the edge of the web **24** to maintain the roll-over flap in locked position, especially when the container is loaded with product and outwardly directed forces are exerted against the side walls.

Another embodiment is shown in figure 10, wherein only a single hook **41** is provided on each end flap, with the hook pointing toward the associated side wall, but in this embodiment the hook is formed on the tab **22** adjacent the associated side wall, rather than on the tab **21** at the outer end of the flap **16** or **17** as in the figure 11 embodiment.

A further embodiment is shown in figure 12, wherein a hook **41** is formed in each notch **20**, but the hooks are both oriented in the same direction, toward the side wall to which the associated end flap is attached, whereby both of the hooks will engage the edge of a respective web **24** more tightly when the associated side wall has an outward force exerted on it.

A blank for forming a cover **50** incorporating the self-locking roll-over flap and hook of the invention is shown in figure 13. The cover includes a central panel **51** that forms the top wall of the cover when it is erected, opposite side wall panels **52** and **53**, and opposite end wall panels **54** and **55** each incorporating a roll-over flap **23** as previously described. Slits **56** separate the end wall panels from end flap panels **57** and **58**. The slits extend in alignment with the score line **59** that joins the side wall panel to the central top panel, and a narrow portion of the adjacent end flap panel and end wall panel is crushed at **60** on both sides of the slit to relieve some of the pressure created when the tightly fitting components are folded into set-up position. As shown in this embodiment, a single hook **41** is formed in a notch **20** on each end flap panel, for engagement with one of the webs **24** formed in a respective end wall panel **54** and **55**, whereby when the cover is erected and the roll-over flap **23** is folded into position, an edge of the web **24** is engaged beneath the hook to securely retain the web and roll-over flap in position. Additionally, crushed areas **61** and **62** are formed in the top panel **51** closely adjacent the score line **63** that joins the end wall panel to the top panel, to form a shallow recess for receiving the end flaps when the cover is in its set-up position. This relief feature is helpful when the slit **56** separating the end flaps from the end wall is in alignment with the score line **59**, due to the tight fit of the components in this configuration.

Another embodiment of a cover **70** incorporating the hook lock of the invention is shown in figure 14. In this embodiment, a single hook **41** is provided on each end flap, as in the previous

embodiment, but the slit 71 separating the end flap panel from the adjacent end wall panel is spaced slightly outwardly out of alignment with the score line 72 that joins the side wall panel to the top panel, and the material on opposite sides of the slit is not crushed. However, this embodiment of the cover incorporates a unique cover lock tab 73 for securing the cover to a container 10. The cover lock tab is in the end walls of the cover, and is formed by a shaped cut 74 extending from the end wall panel 75 into the adjoining roll-over flap 76, whereby when the end wall panel and roll-over flap are folded into operative position the tab projects from the edge of panel 75 generally coplanar therewith. The shaped cut defines a pair of outwardly and downwardly projecting wings 77 and 78 on the lower end of the tab, which has an arcuate concave shape 79 extending between the wings. When the cover is placed on a container, the tab projects downwardly from the lower edge of the cover end wall into proximity with the hand holds in the container end wall, and can be easily inserted into the hand holds by pressing the tab inwardly. The wings then spring outwardly, engaging against the container end wall behind the handholds and retaining the cover in place. The arcuate concave shape 79 on the end of the tab facilitates insertion of a finger or fingers behind the end of the tab to pull it back out through the handhold when it is desired to unlock the tab for removal of the cover from the container.

Figure 15 illustrates a cover 70 with the cover lock tab 73 in position on a container 10 and the lock tab inserted through the handhold 80. It should be noted that when a person inserts their hand in the opening to lift the container, the lock tab folds inwardly out of the way, but springs back when the hand is removed from the opening so the lock tab can be released when desired. The container shown has diagonal corner panels 81 at least at two of the corners, and the end walls 15 extend at their opposite edges 82 beyond the diagonal corner panels, terminating in line with the adjacent side wall. Shaped recesses 83 are formed in the extended edges of the end wall, forming bag cuff grab means for holding the rolled over top of a bag 84 placed in the container. See figure 16.

Although particular embodiments of the invention are illustrated and described in detail herein, it is to be understood that various changes and modifications may be made to the invention without departing from the spirit and intent of the invention as defined by the scope of the appended claims.